tion, she had hand motions vision OU, a failed corneal graft with corneal thinning and an epithelial defect in the right eye, and severe corneal thinning with a corneal perforation in the left eye. The corneal perforation in the left eye was managed with cyanoacrylate glue and a bandage contact lens. The patient was malnourished because of her social situation and psychiatric deterioration, with a vitamin A level of 5 µg/dL. After improving nutritional intake, both eyes improved, with resolution of the epithelial defect in the right eye and stabilization of the perforation in the left eye. She was discharged with recommendations to continue oral vitamin A supplementation.

Comment. The World Health Organization lists vitamin A deficiency as one of the most important causes of preventable childhood blindness. Vitamin A deficiency has been isolated to cases of vitamin A deficiency, mucin deficiency occurs as a result of abnormal terminal differentiation of the conjunctival goblet cells in which vitamin A plays a crucial role, and aqueous tear deficiency from secondary Sjogren syndrome compounds the effect of mucin deficiency on corneal health. In cases 2 and 3, although anti-Ro and anti-La antibody tests were not performed, given that clinical improvement was only seen after initiation of vitamin A therapy, we believe that the vitamin A deficiency played a more significant role than the secondary Sjogren syndrome in the development of the clinical findings.

In all 4 cases, the underlying vitamin A deficiency was not recognized until severe ocular surface disease was seen, in many cases requiring surgical intervention. This may be because of the perception that vitamin A deficiency does not occur in developed nations. However, our cases remind us that in refractory cases of ocular surface disease not amenable to standard treatments, especially in the setting of psychiatric conditions, autistic children, and malabsorption syndromes, one should consider vitamin A deficiency. Complications of this condition are preventable with vitamin A supplementation by the appropriate route.

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4. Cooney TM, Johnson CS, Elner VM. Keratoconjunctivitis sicca or exposure keratopathy. Without treating the underlying vitamin A deficiency, these ocular surface conditions are progressive and refractory to lubricating therapy or even surgical intervention.

In the developed world where vitamin A deficiency is thought to be nearly eradicated, severe ocular surface disease due to vitamin A deficiency has been isolated to cases of malnutrition in patients with psychiatric conditions or malabsorption syndromes due to chronic liver or gastrointestinal disease. Cooney and associates described a malnourished psychiatric patient who, like case 4, had bilateral corneal perforations secondary to vitamin A deficiency before she was diagnosed and treated with the appropriate supplementation. Lewis and colleagues, similar to case 3, described an autistic child with a diet restricted mainly to carbohydrates who developed xerophthalmia due to profound vitamin A deficiency that improved only with vitamin A supplementation. The association between xerophthalmia and iatrogenically induced malabsorption syndromes in obese patients who have undergone bariatric surgery is also noteworthy given the increasing rate of obesity in the United States.

Primary biliary cirrhosis is an autoimmune condition characterized by the progressive destruction of intrahepatic biliary canaliculi, ultimately resulting in malabsorption of fat-soluble vitamins. A significant proportion of patients with primary biliary cirrhosis also have secondary Sjogren syndrome. In the patients who have developed vitamin A deficiency, mucin deficiency occurs as a result of abnormal terminal differentiation of the conjunctival goblet cells in which vitamin A plays a crucial role, and aqueous tear deficiency from secondary Sjogren syndrome compounds the effect of mucin deficiency on corneal health. In cases 2 and 3, although anti-Ro and anti-La antibody tests were not performed, given that clinical improvement was only seen after initiation of vitamin A therapy, we believe that the vitamin A deficiency played a more significant role than the secondary Sjogren syndrome in the development of the clinical findings.

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Retinal Dystrophy in 2 Brothers With α-Mannosidosis

α-Mannosidosis is a rare, autosomal, recessive, lysosomal storage disease that arises from a deficiency in lysosomal α-mannosidase. It occurs in approximately 1 in 500,000 births and can be caused by 40 different mutations in the gene, MAN2B1, which is located on chromosome 19. Clinical characteristics include cognitive, motor, and hearing impairment, facial and skel-
et al abnormalities, psychosis, and immunodeficiency. Elevated levels of mannose-rich oligosaccharides in urine are suggestive of the disease but diagnosis is made by measuring enzymatic function in leukocytes or other cells; genetic testing can confirm the diagnosis.1

Since its first description in 1967, most reports of ocular manifestations have centered on corneal or lenticonular opacities and strabismus.2,3 More recently, Springer et al4 described late-onset retinal dystrophy characterized by decreasing visual acuity and diminished full-field electroretinograms. To the best of our knowledge, abnormal fundus changes have yet to be documented in this disease. Herein we describe 2 further cases of retinal dystrophy supported by fundus photography, autofluorescence, and spectral-domain optical coherence tomography.

Report of Cases. Case 1. A 53-year-old man was referred for evaluation of decreased visual acuity over the past 2 years. He had a diagnosis of α-mannosidosis since childhood, which was confirmed by a repeated enzyme assay in his forties. He had associated cognitive impairment, musculoskeletal dystrophy, and hearing loss and was nonverbal. According to his caregiver, he previously had normal vision including normal findings on eye examinations, but during the past 2 years he had increasing difficulty with near tasks. On examination, the patient had coarse facies and evidence of prior craniosynostosis surgery and was unable to ambulate. Visual acuity was central, steady, and maintained in both eyes; pupils were equally round and reactive without an afferent pupillary defect. Confrontational visual fields were full, and intraocular pressure was 14 mm Hg in the right eye and 16 mm Hg in the left. Anterior segment examination was notable for a slight corneal haze in the right eye only but was otherwise unremarkable. Lenses showed minimal nuclear sclerosis. Fundus examination revealed slightly pale discs with a cup-disc ratio of 0.1. There was attenuation of the retinal vasculature. The posterior pole demonstrated mottled patches of the retinal pigment epithelium (RPE), most notable in the macula and surrounding the fovea. Additionally, there were numerous nummular yellow-white deposits evident at the level of the RPE (Figure 1). There was no foveal light reflex or peripapillary sparing, and there were no bone spicule pigmentary changes in either eye. Spectral-domain optical coherence tomography revealed retinal thinning, with loss of the outer retina and inner segment–outer segment junction, RPE atrophy with a corresponding highly visible choroid, and a slight epiretinal membrane (Figure 2). Fundus autofluorescence showed granular areas of hypoautofluorescence in the macula as well as in the posterior pole surrounding the optic nerve where speckled hyperautofluorescence was intermixed with hypoautofluorescent areas (Figure 3).

Case 2. The brother of the patient described in case 1 was also examined. He was a 51-year-old man who also had a diagnosis of α-mannosidosis characterized by more severe cognitive impairment, hearing loss, and wheelchair dependence and was nonverbal. Findings of physical examination were similar, with coarse facies and macroglossia. Visual acuity was central, steady, and maintained in both eyes. Anterior segment was unremarkable with the exception of minimally nuclear sclerotic lenses. Fundus examination disclosed more severe retinal degeneration with symmetrical waxy pallor of the optic discs and extensive chorioretinal atrophy of the peripapillary RPE and macula with pigment clumping (Figure 1). Spectral-domain optical coherence tomography demonstrated a grossly thinned retina with disruption of

Figure 1. A. Fundus photographs of case 1 showing retinal pigment epithelium (RPE) atrophy and pigment mottling with numerous yellow-white deposits at the level of the RPE. B. Fundus photograph collages of case 2 showing more severe RPE atrophy with pigment clumping.
retinal layers, atrophy of the RPE, a prominently visible choroid, and loss of inner segment–outer segment junction (Figure 2).

Comment. This case series provides the first clinical description of the retinal appearance in human patients with α-mannosidosis and retinal dystrophy in the sixth decade of life, which appears to be typified by dysfunction and subsequent atrophy of the RPE with resulting choriotinal atrophy. Unfortunately, owing to the patients’ inability to cooperate, it was not possible to obtain electroretinograms. Nevertheless, the degree of retinal dystrophy is consistent with the severely depressed or extinguished responses presented by Springer et al.4 Furthermore, the patients we describe and those reported by Springer et al suggest a progressive nature of the degeneration. The fundus autofluorescence of the less severely affected brother (case 1) shows an area of RPE loss involving the macula and a surrounding area of speckled hyperautofluorescence and hypoaurofluorescence, suggesting evolving RPE dysfunction. The fundus of the more severely affected brother demonstrates widespread severe RPE atrophy. The patients described by Springer et al reportedly had normal findings on fundus examination; however, these patients were younger and, considering their ability to provide subjective visual acuity, had presumably less progressed disease.

The progression with age may correlate with progressive changes demonstrated on histopathology, namely the accumulation of lysosomal storage material. As a result of defective or deficient α-mannosidase, insufficient breakdown and subsequent accumulation of mannose-rich oligosaccharides in tissue occurs throughout the body.1 The accumulated material appears as vacuoles on histopathology. While human studies are limited, pathologic examination of bovine ocular specimens shows vacuolation of cells from the cornea, lens, and all cell types of the retina as well as the pigment epithelium; electron micros-
copy of these vacuoles suggests secondary lysosomes. It is unknown exactly how the impaired lysosomal function results in the clinical features, but it is likely that retained storage material in the retina along with other, yet-to-be-elucidated mechanisms results in widespread RPE dysfunction and photoreceptor death.

In conclusion, the 2 patients presented herein and those described by Springer et al demonstrate that, in addition to corneal and lenticular opacity, retinal dystrophy may develop in patients with α-mannosidosis. Consideration of retinal function, either through ERG or detailed fundus examination, is warranted prior to planning any surgical correction of corneal or lenticular opacity. Further study is required to determine the frequency with which it occurs and the rate of progression.

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Spontaneous Regression of Small Melanocytic Choroidal Tumor

The management of small melanocytic choroidal tumors is controversial because the natural course and metastatic potential of these lesions are not clearly defined. Factors predictive of growth into melanoma include a tumor thickness greater than 2 mm; the posterior margin touching the optic disc; presence of symptoms (flashing, floaters, and blurred vision), orange pigment, and subretinal fluid; ultrasonographic hollowness; absence of halo; and absence of drusen.

The purpose of our report is to describe the rare behavior of 2 cases of small melanocytic choroidal tumors with several risk factors for growth into melanoma that exhibited spontaneous regression during follow-up. To the best of our knowledge, both cases represent the first description of spontaneous regression of small melanocytic choroidal tumors with risk factors for growth into melanoma.

Report of Cases. Case 1. A healthy 23-year-old woman was referred to our ophthalmology department after complaining of distorted vision (metamorphopsia) and blurred vision in the right eye for more than 1 month. Her visual acuity was 20/25 in the right eye and 20/20 in the left eye. During a fundus examination of the right eye, she was found to have an oval melanotic juxtafoveal choroidal lesion with clumps of orange pigment spreading over the surface. Furthermore, it had overlying subretinal fluid extending into the macula, and neurosensory macular detachment was demonstrated by optical coherence tomographic scans. B-scan ultrasonography revealed a choroidal mass 6.49 mm in width and 2.27 mm in thickness.

Figure 1. A healthy 23-year-old woman with metamorphopsia and blurred vision in the right eye (case 1). A, Fundus photography of the right eye at baseline reveals oval and melanotic lesion with orange pigment clumps and overlying exudative subretinal fluid affecting the macula. B, B-scan ultrasonography reveals choroidal mass. C, Optical coherence tomographic scan reveals macular neurosensory retinal detachment.